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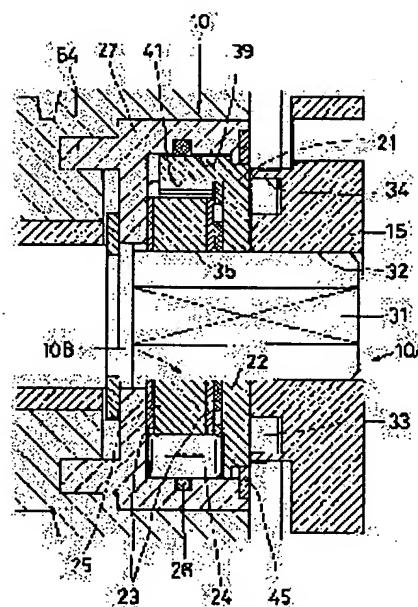
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(54) ROTATION OUTPUT DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a rotation output device provided with a lock mechanism, which reduces shock sound and a shock load produced by rotation by inertia on the output side when a rotation output is stopped by stopping driving, and which can always perform locking operation smoothly.

SOLUTION: This rotation output device comprises an output transmission mechanism connecting a rotation driving member with a rotation output member for transmitting a rotation force while forming a play angle for preventing the rotation force from being transmitted; and a lock mechanism for locking normal rotation or reverse rotation from the rotation output member side by pressing a lock member to a fixed member by a lock operation member, and for enabling the lock of the locking member to be released by the normal rotation or the reverse rotation from the rotation driving member side, and between the rotation driving member side and the rotation output member side, a controlling means for controlling both of the members to given controlled positions by an energizing force is interposed. When a driving is stopped, an energizing force of the controlling means apply braking and buffering effect to rotation by inertia of the rotation output member side, whereby the rotation output can be quietly stopped without producing shock and shock sound accompanied by sudden stop.



10 - 回転駆動部	24 - ロック操作部	32, 35 - 伝達機構
15 - 伝達部	27 - ばね	39 - 固定面
21 - リロック部	31 - 固定部	41 - リロック部

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CLAIMS

[Claim(s)]

[Claim 1] The rotation driving member which outputs rotation driving force, and the rotation output member which outputs turning effort in response to the drive of this rotation driving member The output driving mechanism which a predetermined include-angle part turning effort is not delivered to a hand of cut mutual in a coaxial heart top and which was connected so that it might play, an angle might be formed and turning effort might be transmitted, Predetermined spacing is separated to radial and the holddown member which was located in the periphery section of said rotation output member and this member, and fixed rotation is opposite-*(ed) to it. Between these rotation output member and a holddown member The lock member which locks the normal rotation or the inversion from the above-mentioned rotation output member side by carrying out the pressure welding of the lock member concerned to a holddown member, The lock operating member which carries out pressure-welding actuation of the above-mentioned lock member at a holddown member by the normal rotation or the inversion from the above-mentioned rotation output member side, It has the lock device which infixed and formed the release member which cancels the pressure-welding condition of the above-mentioned lock member, and can carry out lock discharge by the normal rotation or the inversion from said rotation driving member side. Between said rotation driving member side and a rotation output member side The rotation output unit which infixed a regulation means to regulate these both members of both by the energization force in a predetermined regulation location.

[Claim 2] The rotation driving member which outputs rotation driving force, and the rotation output member which outputs turning effort in response to the drive of this rotation driving member The output driving mechanism which a predetermined include-angle part turning effort is not delivered to a hand of cut mutual in a coaxial heart top and which was connected so that it might play, an angle might be formed and turning effort might be transmitted, Predetermined spacing is separated to radial and the holddown member which was located in the periphery section of said rotation output member and this member, and fixed rotation is opposite-*(ed) to it. Between these rotation output member and a holddown member The lock member which locks the normal rotation or the inversion from the above-mentioned rotation output member side by carrying out the pressure welding of the lock member concerned to a holddown member, The lock operating member which carries out pressure-welding actuation of the above-mentioned lock member at a holddown member by the normal rotation or the inversion from the above-mentioned rotation output member side, It has the lock device which infixed and formed the release member which cancels the pressure-welding condition of the above-mentioned lock member, and can carry out lock discharge by the normal rotation or the inversion from said rotation driving member side. To said rotation output member, the 2nd play angle smaller than the play angle of said output driving mechanism is given, and the lock operating member of the above-mentioned lock device is attached. Between the above-mentioned lock operating member and said rotation output member The rotation output unit which established a regulation means to regulate a lock operating member by the energization force to the mid-position of the range which operates said lock member corresponding to normal rotation and an inversion.

[Claim 3] The pair which made said lock member correspond to normal rotation and an inversion from said rotation output member side is formed by the body of revolution made into 1 set. The rotation output unit according to claim 1 or 2 formed by the member equipped with the wedge inclined plane of the pair made to correspond to the normal rotation which said lock operating member is made to correspond to normal rotation and an inversion from said rotation output member side, and carries out the pressure welding of the above-mentioned body of revolution corresponding to a hand of cut to a holddown member by the wedge effectiveness, and an inversion.

[Claim 4] The rotation output unit according to claim 1 or 2 which formed said lock member with the brake shoe which carries out the pressure welding of the holddown member, and was formed by the member equipped with the operating cam side which carries out the pressure welding of the above-mentioned brake shoe to a holddown member, and operates said lock operating member by the normal rotation or the inversion from said rotation output member side.

[Claim 5] The rotation output unit according to claim 1 formed said regulation means between the release member interlocked with a rotation driving member and the rotation output member, formed the regulation crevice in the predetermined regulation location at the above-mentioned release member, energized the above-mentioned regulation crevice by the energization force, and carried out location regulation from this and the rotation output member side which counters.

[Claim 6] The rotation output unit according to claim 1 which formed said regulation means between the tail end edge surface part of a rotation driving member, and the rotation output member, formed the regulation crevice in the above-mentioned tail end edge surface part in the predetermined regulation location, energized the above-mentioned regulation crevice by the energization force, and carried out location regulation from this and the rotation output member side which counters.

[Claim 7] The rotation output unit according to claim 1, 5, or 6 which set the regulation location of said regulation means to the location side corresponding to the location side corresponding to the edge within the play angle of said output driving mechanism, or the location where lock discharge of said lock member was carried out.

[Claim 8] The rotation output unit according to claim 1, 2, 5, or 6 which engaged for them and formed in one regulation crevice 2 sets of snap arms which carried out the extension direction of this snap arm in the opposite direction while forming with the snap arm which extended a means to give the energization force of said regulation means, from the peripheral face of a snap ring to the circumferencial direction, and set up the energization force.

[Claim 9] a location just before this lock member acts said lock member — the elasticity by the side of lock discharge — the rotation output unit according to claim 1 or 2 supported by the supporter material which permits a variation rate.

[Claim 10] The rotation output unit of one publication among claims 1-9 which infixed the buffer member in a fixed means to fix

said holddown member, and were fixed to it.

[Claim 11] claims 1-10 — the power tool which infixed the rotation output unit of one publication in the output system.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] In a power tool like for example, a transmission driver, this invention relates to the rotation output unit which can lock this output shaft, when carrying out halt control of the motor and stopping that output shaft.

[0002]

[Description of the Prior Art] Conventionally, as what was equipped with the function which locks the output shaft when halt control of the motor is carried out in the power tool of the above-mentioned example, the rotation tool of an indication is in JP,6-53350,B, for example.

[0003] However, the projection formed on the periphery of the input shank material into which the tool of this conventional technique inputs driving force, A making [into 1 set]-pair which it had [pair] play in predetermined include angle, and made the projection formed on periphery of output shaft which outputs turning effort correspond in forward hand-of-cut and direction of inverse rotation among both projections within connection condition, and nothing and this play angle roller, The wedge effectiveness inclined plane of 1 set of pair which is made to correspond in an above-mentioned forward hand of cut and the above-mentioned direction of inverse rotation, and is locked by the wedge effectiveness is formed in an output-shaft side, and the lock device is constituted.

[0004] By the device, conventionally [this] transfer of the turning effort from input shank material Driving force is transmitted to the projection by the side of the projection by the side of input shank material, a roller, and an output shaft at an output shaft, canceling the lock condition of a lock device. When transmit a forward or reverse turning effort, rotation of input shank material is stopped, an output shaft is manually etc. played in the forward or reverse direction and a part for an angle is rotated, an above-mentioned roller bites to the wedge effectiveness inclined plane corresponding to a hand of cut, and rotation is locked by the wedge effectiveness.

[0005] Therefore, since this lock will act by performing forward or reverse rotation for a play angle of an output shaft although an output shaft will be in the condition that it can lock however if the drive of input shank material is stopped, the following trouble arises by rotation for this play angle.

[0006] Namely, when working by attaching the disc-like body of revolution of others, the high tool, for example, the hole saw, of a rotation load, in an above-mentioned output shaft through a chuck, Although a lock tends to act and it is also going to suspend rotation of a tool after a tool played and rotates by the angle since a tool tends to continue rotation by the inertia, if halt control of the motor is carried out as mentioned above, the drive of input shank material is stopped and rotation of an output shaft is stopped By being locked suddenly and stopped; without the rotation from a tool side making it brake An impact arises in a lock member (the above-mentioned roller) and the member (the projection by the side of the above-mentioned input shank material, projection by the side of an output shaft) which touches this, and a loud impulsive sound whose big impact load is applied to these members both occurs.

[0007] Moreover, although this lock will be removed by that counteraction, a tool will be played with and rotated by the angle to hard flow and a lock will act in the wedge operation by the side of this inversion direction again when it stops rapidly as mentioned above However, since the chattering phenomenon in which rotation of an above-mentioned forward inversion is continued two or more times, and repeats forward inverse rotation to an output shaft will arise and this phenomenon will be shockingly produced according to the inertia of a tool being large if the inertia produced in an above-mentioned tool is large With generating of the chattering by loud impulsive sound, it becomes the trouble which invites the breakage and damage on an internal configuration element.

[0008] Moreover, since it is transmitted to the projection by the side of the projection by the side of input shank material, a roller, and an output shaft and a roller is pressed by projection by the above-mentioned conventional device as transfer of the turning effort from input shank material mentioned above If it will be in the condition of the viscosity of these projections [rollers or projections] for oiliness of grease etc. increasing by secular use, and being easy to paste them up, it will become the trouble that a roller will be fixed to a projection, this roller will not move to the location where a lock acts, and a lock does not act also where press of a roller is canceled.

[0009]

[Problem(s) to be Solved by the Invention] This invention is the rotation output unit equipped with the lock device, and when a drive is stopped and a rotation output is suspended, generating of the impulsive sound made in rotation by the inertia of an output side is abolished, and an impact load is reduced, and it aims at offer of the rotation output unit which can make a lock operation always perform to coincidence smoothly.

[0010]

[Means for Solving the Problem] This invention the rotation driving member which outputs rotation driving force, and the rotation output member which outputs turning effort in response to the drive of this rotation driving member The output driving mechanism which a predetermined include-angle part turning effort is not delivered to a hand of cut mutual in a coaxial heart top and which was connected so that it might play, an angle might be formed and turning effort might be transmitted, Predetermined spacing is separated to radial and the holddown member which was located in the periphery section of said rotation output member and this member, and fixed rotation is opposite-*(ed) to it. Between these rotation output member and a holddown member The lock member which locks the normal rotation or the inversion from the above-mentioned rotation output member

side by carrying out the pressure welding of the lock member concerned to a holddown member, The lock operating member which carries out pressure-welding actuation of the above-mentioned lock member at a holddown member by the normal rotation or the inversion from the above-mentioned rotation output member side, It has the lock device which infixed and formed the release member which cancels the pressure-welding condition of the above-mentioned lock member, and can carry out lock discharge by the normal rotation or the inversion from said rotation driving member side. Between said rotation driving member side and a rotation output member side It is characterized by being the rotation output unit which infixed a regulation means to regulate these both members of both by the energization force in a predetermined regulation location.

[0011] When according to the above-mentioned configuration the drive by the side of a rotation driving member is stopped and rotation of a rotation output member is suspended, Since the energization force of a regulation means gives braking and an operation of a buffer to ** to which this rotation output member tends to continue rotation by the inertia produced in a rotation output member side, and this turning effort and it regulates in a regulation location, there is no generating of the impact and impulsive sound accompanying a rapid halt, and it can be made to stop calmly.

[0012] Furthermore, even if it is the case that the inertia produced in the above-mentioned rotation output member is larger than the energization force of a regulation means and jumps out of the once regulated regulation location Since the operation of braking and the buffer by the energization force of a regulation means is still working to the turning effort by the inertia, it decreases at an early stage and is regulated by the regulation location, and rotation by the inertia of a rotation output member does not have generating of a chattering, and is suspended by **.

[0013] Furthermore, this invention is equipped with an above-mentioned output driving mechanism and an above-mentioned lock device. To said rotation output member, the 2nd play angle smaller than the play angle of said output driving mechanism is given, and the lock operating member of the above-mentioned lock device is attached. Between the above-mentioned lock operating member and said rotation output member It is characterized by being the rotation output unit which established a regulation means to regulate a lock operating member by the energization force to the mid-position of the range which operates said lock member corresponding to normal rotation and an inversion.

[0014] If this rotation output member continues rotation at the inertia produced in a rotation output member side when according to the above-mentioned configuration the drive by the side of a rotation driving member is stopped and rotation of a rotation output member is suspended, the lock member corresponding to the method opposite side of rotation is operated, and a lock operating member locks rotation of a rotation output member. Furthermore, since the energization force of the regulation means which is carrying out location regulation brakes a lock operating member and the inertia at the time of this lock (or impact) buffers it, it does not have generating of the impact and impulsive sound accompanying a rapid halt, and can be stopped calmly.

[0015] Furthermore, it is the case that the inertia (or impact) produced with an above-mentioned lock is larger than the energization force of a regulation means, and since the operation of braking and the buffer by the energization force of a regulation means is still working to the turning effort by the inertia even if it jumps out of a regulation location, it decreases at an early stage, and rotation by the inertia of a rotation output member is regulated by the regulation location, and is suspended calmly.

[0016] As a gestalt of operation, a rotation driving member can be constituted from body of revolution of the tail end of the epicyclic gear moderation device in which a motor output is slowed down, and a rotation output member can be formed in the shape of a shaft. Moreover, the holddown member of a lock device can be formed in the shape of a ring.

[0017] As a gestalt of operation, two or more sets of lock operation parts by the lock member and the lock operating member can be formed in the above-mentioned lock device.

[0018] moreover, the body of revolution (metal — it is — the shape of a roller —) which makes 1 set the pair which made said lock member correspond to normal rotation and an inversion from said rotation output member side cylindrical — being spherical — it can form and can form by the member equipped with the wedge inclined plane of the pair made to correspond to the normal rotation which said lock operating member is made to correspond to normal rotation and an inversion from said rotation output member side, and carries out the pressure welding of the above-mentioned body of revolution corresponding to a hand of cut to a holddown member by the wedge effectiveness, and an inversion.

[0019] Moreover, said lock member can be formed with the brake shoe which carries out the pressure welding of the holddown member, and it can form by the member equipped with the operating cam side which carries out pressure-welding actuation of the above-mentioned brake shoe for said lock operating member at a holddown member by the normal rotation or the inversion from said rotation output member side.

[0020] As a gestalt of operation, said regulation means is formed between the release member interlocked with a rotation driving member and a rotation output member, a regulation crevice is formed in a predetermined regulation location at the above-mentioned release member, from a this side and the rotation output member side which counters, the above-mentioned regulation crevice can be energized at the energization force, and location regulation can be carried out.

[0021] Moreover, said regulation means is formed between the tail end edge surface part of a rotation driving member, and a rotation output member, a regulation crevice is formed in the above-mentioned tail end edge surface part in a predetermined regulation location, from the this and rotation output member side which counters, the above-mentioned regulation crevice can be energized by the energization force, and location regulation can be carried out.

[0022] As a gestalt of operation, the location side corresponding to the edge within the play angle of said output driving mechanism, said lock member can set the regulation location of said regulation means to the location side corresponding to the location by which lock discharge was carried out, and can also set it as the midpoint within a play angle further.

[0023] Moreover, while forming with the snap arm which extended a means to give the energization force of said regulation means, from the peripheral face of a snap ring to the circumferential direction, and set up the energization force, 2 sets of snap arms which carried out the extension direction of this snap arm in the opposite direction can be engaged and formed in one regulation crevice. According to this configuration, buffer actuation (snap action) corresponding to the normal rotation side of a regulation means and an inversion side can be made into the same conditions.

[0024] a location just before this lock member acts said lock member as a gestalt of operation — the elasticity by the side of lock discharge — it can support by the supporter material which permits a variation rate, and it can form so that elasticity may produce this supporter material with the ingredient by piano wire rods or synthetic resin, a metal plate, etc. According to this configuration, a supporter material side can also buffer the impact at the time of a lock operation.

[0025] As a gestalt of operation, a buffer member can be infixed in a fixed means to fix said holddown member of a lock device, and it can fix to it. According to this configuration, a fixed means side can also buffer the impact at the time of a lock operation.

[0026] Furthermore, the rotation output unit of this invention can be infixed in the output system of a power tool, and also it can

be used for the equipment which needs a rotation output.

[0027]

[Function and Effect of the Invention] According to this invention, the lock operating member of a lock device is regulated by the energization force of a regulation means by the energization force at a position through a rotation driving member, a rotation output member, and a rotation output member.

[0028] By this, work by attaching the disc-like body of revolution of others, the high tool, for example, the hole saw, of a rotation load, in a rotation output member through a chuck, for example, a motor is suspended. When the drive of a rotation driving member is stopped and rotation of a rotation output member is stopped, the energization force of a regulation means gives braking and an operation of a buffer to the turning effort by ** to which a rotation output member tends to continue rotation by that inertia, and this inertia. Since it regulates in a regulation location, it can **, if there is no generating of the impact and impulsive sound accompanying a rapid halt, it is muffled and ** is stopped.

[0029] Furthermore, it is the case that the inertia of an above-mentioned rotation output member is large than the energization force of a regulation means, and since an operation of braking and the buffer by the energization force of a regulation means is still keeping on working in this turning effort even if it jumps out of the once regulated regulation location, it decreases at an early stage and it is regulated by the regulation location, and there is nothing in generating of a chattering, and the turning effort by inertia is muffled and is stopped by **.

[0030] Therefore, there is no generating of the impact and impulsive sound accompanying a halt of a rotation driving member, and ** can be stopped, and the breakage and damage on an internal configuration element based on an above-mentioned impact can be prevented.

[0031] Furthermore, since the turning effort of the output driving mechanism by the rotation driving member and the rotation output member is not applied to a lock device as a load, it can be lost that the lock member of this lock device is pressed by the member by the side of lock discharge, and fixes, and a lock operation of a lock member can be made to always perform smoothly.

[0032]

[Embodiment of the Invention] The gestalt of 1 implementation of this invention is explained with a drawing below. An example shows the rotation output unit used for the power tool of a hand type, and the above-mentioned rotation output unit 10 is formed in the output side latter part of the motor M which carries out a forward inversion in drawing 1.

[0033] The epicyclic gear moderation device 12 is connected to the motor shaft 11 of the above-mentioned motor M. This epicyclic gear moderation device 12 The planet gear 14 which gears with a sun gear 13 and this sun gear 13, and the carrier 15 which supported this planet gear 14 to revolve, The internal gear 16 which gears with a planet gear 14, and the stop ring 17 which holds this internal gear 16 rotatable constitute, and these are the transmission elements of a rotation transmission system, it has a moderation function as everyone knows, and the moderation output is outputted from a carrier 15.

[0034] Moreover, spline fitting etc. inserted in each other's above-mentioned motor shaft 11, and it is connected using structure so that rotation may be transmitted to the sun gear 13 of the epicyclic gear moderation device 12.

[0035] The rotation output unit 10 was constituted in the latter-part side of the above-mentioned epicyclic gear moderation device 12, and this rotation output unit 10 is equipped with output driving mechanism 10A which transmits the output from the carrier 15 of the epicyclic gear moderation device 12 to an output shaft 28, and lock device 10B which locks the normal rotation or the inversion from an output-shaft 28 side, respectively as shown also in drawing 2.

[0036] Above-mentioned output driving mechanism 10A is set to a carrier 15 and an output shaft 28, as shown also in drawing 5. Form in an parallel flat surface two peripheral surfaces which counter an output shaft 28 on both sides of the axis, and the shaft form connection section 31 is formed. the hole which fits into the axis section of the carrier 15 corresponding to this with the play angle alpha of 20 angles — a carrier 15 and an output shaft 28 are connected with the play which the turning effort for the play angle alpha is not delivered by forming the type connection section 32 and carrying out fitting of these connection sections 31 and 32.

[0037] The above-mentioned lock device 10B is equipped with the release ring 21, the retaining rings 23 and 23 of 22 or 2 snap rings, the wedge roller 24, a lock ring 25, a rubber ring 26, and a stop ring 27 as shown also in drawing 2, drawing 3, and drawing 4, and except for the wedge roller 24, each element is formed in the shape of a ring, and is arranged on the same axis.

[0038] In the tooth back of the above-mentioned release ring 21, pins 33 and 33 are formed successively on both sides of an axis in the target location, and these pins 33 and 33 rotate synchronizing with the play angle alpha by the side of a carrier 15 by engaging with the communicating pores 34 and 34 formed in the location where the carrier 15 mentioned above corresponded.

[0039] in addition, the core of the above-mentioned release ring 21 — the hole of a carrier 15 — the same hole as the type connection section 32 — the type connection section is formed and fitting of the shaft form connection section 31 of an output shaft 28 is carried out to this.

[0040] The above-mentioned lock ring 25 forms the hole form connection section 35 for it being in agreement without the shaft form connection section 31 of the above-mentioned output shaft 28, and play, fitting into the axis section, and an output shaft 28 being interlocked with. It divides into the location (location of 120 angles spacing) of three places which carried out equal arrangement at the periphery section, and projection 36 — is formed. This partition projection 36 — moreover, on circumferential direction both sides It is made to correspond to forward rotation of an output shaft 28 and inverse rotation, and wedge inclined plane 37a — and 37b — which made the projection 36 side low are formed.

[0041] The shape of a roll is made to correspond to nothing and the wedge inclined planes 37a and 37b of the above-mentioned lock ring 25, the above-mentioned wedge roller 24 arranges it, therefore this wedge roller 24 makes a pair two pieces made to correspond to forward inverse rotation, 3 sets is used, and the above-mentioned partition projection 36 and the wedge inclined planes 37a and 37b are also formed corresponding to these 3 sets.

[0042] Moreover, the die length of the wedge roller 24 is formed for a long time than the width of face (thickness) of a lock ring 25, and is supported with the retaining rings 23 and 23 before and after mentioning the both ends above.

[0043] Therefore, support projection 38 — is formed in the location (location of 120 angles spacing) of three places which carried out equal arrangement at the periphery section of each of retaining rings 23 and 23, and one pair of wedge rollers 24 and 24 of the above-mentioned in circumferential direction both sides of this support projection 38 — are supported. In addition, the core of retaining rings 23 and 23 is formed in a circle configuration.

[0044] The above-mentioned rubber ring 26 is the wedge roller 24 supported as mentioned above. — It touches outside and rotation is given to wedge roller 24 — of each [this frictional resistance].

[0045] If the inner skin 39 which an above-mentioned lock ring 25 and above-mentioned retaining rings 23 and 23 are certain in

formed and put in another way, the above-mentioned stop ring 27 in radial, inner skin 39 and the peripheral face of a lock ring 25 (and output shaft 28) will separate predetermined spacing, and will counter. It is spacing to which the wedge roller 24 of the above-mentioned pair and 24 — may be located between the wedge inclined planes 37a and 37b of the pair of a lock ring 25, and the above-mentioned inner skin 39. And the wedge inclined planes 37a and 37b are set as spacing from which the wedge rollers 24 and 24 separate from the location locked (a pressure welding carried out) and this **** lump location (a pressure-welding location or lock location) and which bites, and they can move to the location of lock discharge.

[0046] In addition, the width of face of the circumferential direction of the support projection 38 of the above-mentioned retaining rings 23 and 23 is set as the width of face which the wedge rollers 24 and 24 support in the location of lock discharge.

[0047] Release projection 41 — which performs lock discharge of the above-mentioned wedge rollers 24 and 24 is carrying out connection formation on the side face of the release ring 21 mentioned above.

[0048] That is, it is made to correspond to 3 sets of wedge roller 24 —, and above-mentioned release projection 41 — is arranged in the location (location of 120 angles spacing) of three places which carried out equal arrangement at the wedge rollers 24 and 24 of the release ring 21, and the side which counters.

[0049] In the play angle alpha of the release ring 21 and output shaft 28 which pressed the wedge rollers 24 and 24 which correspond by each end face of that circumferential direction to the hand of cut, and performed lock discharge, and mentioned the operation of this lock discharge above, the above-mentioned release projection 41 has set up the width of face (or die length) of the circumferential direction of the release projection 41 so that an operation of lock discharge may be especially completed at the both ends of this play angle alpha.

[0050] Above-mentioned release projection 41 — is equipped with the regulation means for regulating this by the energization force when the location side of the lock discharge corresponding to forward rotation or inverse rotation has this release projection 41.

[0051] That is, forward rotation and inverse rotation are made to correspond to the field by the side of the axis of the above-mentioned release projection 41, and the regulation crevices 42a and 42b are formed.

[0052] It has prepared in the above-mentioned regulation crevices 42a and 42b so that it may be engaged in the condition of having energized by the energization force in which the regulation heights 43 of the snap ring 22 mentioned above were set up.

[0053] The above-mentioned regulation heights 43 are the snap arms 44 which the circumferential direction of the same direction was made to extend and were formed from the location of three places on the periphery of a snap ring 22 which carried out equal arrangement. — It forms in the free end section. Furthermore, relative-position relation is set up so that it may be engaged, when the regulation crevices 42a and 42b are located in the location of lock discharge, respectively, and the energization force is set as the energization force a little smaller than the driving force by the side of Motor M while acquiring it with the ingredient elasticity produced on the snap arm 44. In addition, a setup of the above-mentioned energization force is because the change of the regulation projection 43 is enabled on another side from one side of the regulation crevices 42a and 42b, when Motor M is rebooted.

[0054] Moreover, the core of the above-mentioned snap ring 22 forms the connection section so that it may fit in with the shaft form connection section 31 of an output shaft 28 and may rotate in one.

[0055] Among drawing, 45 are a lid ring, by attaching in a stop ring 27, contain each component to a stop ring 27, and carry out unitization of the rotation output unit 10 to it. The torque limiter is constituted by the above-mentioned epicyclic gear moderation device 12.

[0056] As shown in drawing 1 and drawing 6, in the above-mentioned epicyclic gear moderation device 12, it supports possible [idling] to a stop ring 17, and the outer edge of this internal gear 16 forms the concave convex 50 which follows a circumferential direction, and the internal gear 16 carries out the pressure welding of the ball 51 to this, presses the internal gear 16 to a stationary-plate 52 side, it is regulating the rotation and constitutes the torque limiter.

[0057] Plurality (for example, six pieces) opposite-**(ed) the above-mentioned ball 51 on the internal gear 16 on a periphery. A holddown member 53 is opposite-**(ed) in the outer edge of this internal gear 16, and the location which counters. They are the above-mentioned internal gear 16 of this holddown member 53, and the side which counters. The spring 55 for forming the receipt hole 54 in the above-mentioned ball 51 and a corresponding location, and pressing the above-mentioned ball 51 is contained, the support pin 57 of the receptacle member 56 is inserted, and the outer edge of this spring 55 is held.

[0058] The screw 58 by the square thread can be formed in the periphery section for a narrow diameter portion of the above-mentioned holddown member 53, the nut member 59 can screw in this screw 58, the above-mentioned receptacle member 56 can be moved for the attitude of this nut member 59 to shaft orientations through a ball 60 and a ring 61, and the above-mentioned ball 51 and the torque of the torque limiter by the concave convex 50 of the internal gear 16 can be adjusted by adjusting the elasticity of a spring 55.

[0059] In addition, the above-mentioned nut member 59 can be connected so that rotation may be transmitted like spline fitting as opposed to the actuation covering 62, where sliding to shaft orientations is permitted, and rotation actuation of the nut member 59 can be carried out by carrying out rotation actuation of the actuation covering 62. Moreover, a stationary plate 52, a stop ring 17, and a holddown member 53 are connected with the outside case 63 in one with a proper configuration, and are constituted in the fixed condition.

[0060] And the stop ring 27 of the rotation output unit 10 mentioned above is stopped by the above-mentioned holddown member 53 through the stop section 64, and rotation is fixed. In addition, the stop section 64 can also be constituted so that it may form with a pin-like object and may insert in a pore. An operation of the rotation output unit 10 mentioned above next is explained.

[0061] In drawing 4, if forward rotation of the motor M is carried out and the carrier 15 and the release ring 21 of the epicyclic gear moderation device 12 are rotated to a hand of cut X, wedge roller 24a which corresponds by the end face of the method opposite side of rotation of the release projection 41 will be stuffed into the lock discharge location of wedge inclined plane 37a of a lock ring 25. On the other hand, wedge roller 24b of another side is contacted with the inner skin 39 of a stop ring 27, and this wedge roller 24b is pushed in the lock discharge location of wedge inclined plane 37b by the contact resistance.

[0062] after such lock discharge was completed within the play angle alpha of a carrier 15 and an output shaft 28 and the lock was canceled — the hole of a carrier 15 — since the type connection section 32 and the shaft form connection section 31 of an output shaft 28 will be in a interlocking condition, the driving force of a carrier 15 is transmitted to an output shaft 28, and can rotate this.

[0063] At this time, the regulation heights 43 of the snap arm 44 engage with regulation crevice 42a of the release projection 41, the release ring 21 and a lock ring 25 are the location where the lock was canceled, or the location of one edge of the play angle

alpha, and location regulation will be carried out by the energization force of the snap arm 44.

[0064] In addition, at the time of an above-mentioned drive, it is only that the force required for pushing into the location of lock discharge of wedge roller 24a acts, and the release projection 41 of the release ring 21 does not require a big load for this wedge roller 24a.

[0065] If the drive by Motor M is stopped in the above-mentioned condition, the regulation heights 43 of the snap arm 44 will engage with regulation crevice 42a of the above-mentioned release projection 41, and a carrier 15 and an output shaft 28 will stop with the condition that location regulation was carried out by the energization force of the snap arm 44.

[0066] At this time, a tool is attached in an output-shaft 28 side, when the inertia of this tool is smaller than the energization force of the snap arm 44, it is braked and buffered by this energization force, and a halt is possible for ** in an above-mentioned regulation location.

[0067] Moreover, although inertia overcomes the energization force of the snap arm 44 and the regulation heights 43 engage with regulation crevice 42b of another side when the inertia of an above-mentioned tool is larger than the energization force of the snap arm 44. When engagement to previous regulation crevice 42a separates [this regulation projection 43], in order that that resistance may serve as a braking operation and buffer action and may act on inertial force, this inertial force is decreased at an early stage, and engages with the following regulation crevice 42b, and rotation of the output shaft 28 by inertia stops.

[0068] Thus, since the rotation by the inertia of a tool is regulated by engagement to the regulation crevices 42a and 42b and the regulation heights 43 of the snap arm 44, neither the impact of a member nor generating of impulsive sound is at the time of a halt, and a chattering phenomenon is also avoided, and it can stop in the condition of having been muffled.

[0069] For example, if Motor M is suspended when there is no above-mentioned regulation means (the regulation crevices 42a and 42b, the regulation heights 43, snap arm 44) The support projection 38 of retaining rings 23 and 23 or the partition projection 36 of a lock ring 25 pushes wedge roller 24b by inertia rotation of an output shaft 28 according to the inertia of a tool, and it is made to collide with the edge of the release projection 41. Moreover, retaining rings 23 and 23 and a lock ring 25 carry out inverse rotation by the counteraction, and wedge roller 24a of another side is made to collide with the other-end side of the release projection 41. An impact strong against a member will be given by these collisions, and a still louder impulsive sound will be generated. Moreover, if the inertial force of a tool is large, above-mentioned actuation will be repeated, it will be continued two or more times, and a chattering phenomenon will occur.

[0070] In this example, such a chattering phenomenon, the above-mentioned impact, and generating of impulsive sound can be regulated by engagement of the regulation crevices 42a and 42b and the regulation heights 43 of the snap arm 44, and can be prevented.

[0071] If the forward inversion of this is carried out from an output-shaft 28 side in the condition that the above-mentioned motor M has stopped, the function of lock device 10B will act on this output shaft 28, it will be locked, and the rotation will be suspended.

[0072] That is, if an output shaft 28 is rotated in the forward or reverse direction, the wedge rollers 24a or 24b corresponding to the direction will touch the inner skin 39 of a stop ring 27, it will bite by the contact resistance to this inner skin 39 and the wedge inclined planes 37a or 37b of a lock ring 25 (pressure welding), and each hand of cut will be locked.

[0073] At the time of an above-mentioned lock, when attaching a chuck in an output shaft 28, in addition when [where Motor M is suspended,] carrying out rotation actuation of the power tool, an effective activity can be performed.

[0074] Since one wedge roller 24a is stuffed into a lock discharge location by the end face of the method opposite side of rotation of the release projection 41 and wedge roller 24b of another side is pushed in a lock discharge location by the inner skin 39 of a stop ring 27, and contact when Motor M is rebooted, the drive of an output shaft 28 is attained.

[0075] In addition, since the rubber ring 26 touches this wedge roller 24 — when an output shaft 28 drives and wedge roller 24 — revolves around the sun, it rotates, while wedge roller 24 — revolves around the sun by this contact resistance, and according to an operation of this rotation, an axis is the axis of an output shaft 28, and always maintained at parallel, and the thing of wedge roller 24 — to incline is prevented.

[0076] Drawing 7 shows other examples of the retaining ring 23 of the rotation output unit 10 mentioned above. Although supported by the support projection 38 of a retaining ring 23 in the 1st example in the location of lock discharge of the wedge rollers 24a and 24b, it is supporting in this example in the crevices 71a and 71b of the elastic member 71 which forms with piano wire rods and has elasticity.

[0077] The curve base is carrying out attachment maintenance of the above-mentioned elastic member 71 in the crevice 72 formed corresponding to the retaining ring 23. in addition, the core of a retaining ring 23 — the hole of an output shaft 28 — it forms in the configuration corresponding to the type connection section. however, a circle configuration — it is also — it is good.

[0078] Although the location which the above-mentioned wedge rollers 24a and 24b support is set as the location of lock discharge of the wedge rollers 24a and 24b like the 1st above-mentioned example, this location is equivalent also to the location just before each of the wedge rollers 24a and 24b carries out a **** operation. moreover — since it is supporting with elasticity — the elasticity by the side of lock discharge — it is also permitting a variation rate.

[0079] Thus, if it contacts so that the release projection 41 may carry out lock discharge when elastic support is carried out and the wedge rollers 24a and 24b are in a lock condition, elastic displacement can be carried out and the **** impact can be buffered.

[0080] Drawing 8 shows other examples of the retaining ring 23 of the rotation output unit 10 mentioned above. Although attachment maintenance was carried out and the elastic member 71 which forms in a retaining ring 23 with piano wire rods, and has elasticity was constituted from an example of above-mentioned drawing 7, the wedge rollers 24a and 24b are supported in this example in the crevices 74a and 74b formed in the edge of the arm 73 formed so that predetermined elasticity might arise to a retaining ring 23. in addition, this retaining ring 23 — a metal plate or synthetic resin — forming — moreover, that core — the hole of a carrier 15 — it forms in the configuration corresponding to the type connection section. however, a circle configuration — it is also — it is good.

[0081] Thus, even if constituted, an operation and effectiveness equivalent to the retaining ring 23 shown by drawing 7 can be acquired.

[0082] Drawing 9 - drawing 12 show other examples of the regulation means in the rotation output unit 10. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 is attached, and the detailed explanation is omitted.

[0083] Like the 1st example mentioned above. although the regulation means in this example constitutes by the regulation

crevices 42a and 42b and the regulation heights 43 of the snap arm 44 of a snap ring 22 Forming in the location of the end face of the carrier 15 of the epicyclic gear moderation device 12, and the output shaft 28 corresponding to this location the part which constitutes this regulation means, the snap ring 22 is using further the snap rings 22a and 22b of two sheets which the snap arm 44 reversed.

[0084] Namely, the receipt crevice 82 which had the inner skin 81 which the snap rings 22a and 22b of two sheets can contain in the outside end face of a carrier 15 is formed. The regulation crevices 42a and 42b made to correspond to forward rotation and inverse rotation are formed in the location of three places as for which the inner skin 81 of this receipt crevice 82 carried out equal arrangement in the location of lock discharge of the lock device by the wedge rollers 24a and 24b and the wedge inclined planes 27a and 27b of a lock ring 25.

[0085] The snap rings 22a and 22b contained to the above-mentioned receipt crevice 82 One kind of snap ring 22 which formed the regulation heights 43 in the free end section of the snap arm 44 which extended from the peripheral face of one snap ring 22 to the circumferential direction, and set up the energization force two sheets 22a and 22b The polymerization of the extension direction of each snap arm 44a and 44b was carried out and carried out in the opposite direction, the regulation heights 43a and 43b were piled up, and this piled-up regulation heights 43a and 43b ** are engaged and included in one regulation crevices 42a or 42b.

[0086] Thus, if it is made to act from the direction which carries out the polymerization of the snap rings 22a and 22b, and conflicts the snap arms 44a and 44b, buffer actuation (snap action) corresponding to the forward rotation side of a regulation means and an inverse rotation side can be made into the same conditions. For example, in the 1st example, since (referring to drawing 4) and the snap ring 22 of one sheet are used, if the regulation projection 43 of the snap arm 44 receives a load from the direction of the free end side of the snap arm 44, this load will be received strongly, but when a load is received from the direction of the root side of the snap arm 44, it becomes smooth actuation and buffer actuation (snap action) differs by forward rotation and inverse rotation.

[0087] However, in this example, since the snap arms 44a and 44b of the direction which is different from each other are carrying out the polymerization as mentioned above and the actuation corresponding to each forward rotation and inverse rotation acts on one regulation crevice 42, the buffer actuation corresponding to forward rotation and inverse rotation serves as the same conditions. Of course, the snap ring 22 of the 1st example mentioned above can also be constituted using the snap rings 22a and 22b of two sheets which conflict as mentioned above.

[0088] The flange 83 is formed in the periphery section which counters the carrier 15 of the above-mentioned release ring 21. Form engagement heights 84 — in the location of three places as for which this flange 83 carried out equal arrangement, and a step 85 is formed in the periphery section of a carrier 15 corresponding to this. Engagement crevice 86 — is formed in the location corresponding to above-mentioned engagement heights 84 —, attaching a flange 83 in a step 85 in the condition of having made engagement crevice 86 — engaging with these engagement heights 84 — the release ring 21 and a carrier 15 can be attached in one, where a baffle is carried out. Of course, the snap rings 22a and 22b of two sheets are included as mentioned above in this attachment by the receipt crevice 82.

[0089] In drawing 11, the retaining ring 23 equipped with the elastic arms 73 and 73 shown by drawing 8 is used for the retaining ring 23 which supports the wedge rollers 24a and 24b.

[0090] Moreover, concave stop section 64 — is formed in the location of two or more places as for which the periphery section of a stop ring 27 carried out equal arrangement, and although this concave stop section 64 — engages with the holddown member 53 shown by drawing 1 in the state of a baffle, in this example, it implants pin 87 — in a holddown-member 53 side, and engages with this through buffer member 88 — which has another rubber material and buffer function. That is, at the time of a lock operation of the wedge rollers 24a and 24b, that impact is transmitted also to a holddown member 27, and since it becomes the load made to rotate this, this impact load can be buffered by the above-mentioned buffer member 88.

[0091] drawing 12 — setting — the hole of a lock ring 25 — to fitting of the type connection section 35 and the shaft form connection section 31 of an output shaft 28 The type connection section 35 plays and angle beta is formed. the shaft form connection section 31 of an output shaft 28 — receiving — the hole of a lock ring 25 — this play angle beta the hole of a carrier 15 — it is set as an angle (for example, ten angles) smaller than the play angle alpha of the type connection section 32 and the shaft form connection section 31 of an output shaft 28 (for example, 20 angles). The play angle beta in this example is a setup for making attachment by the shaft form connection section 31 of an output shaft 28 perform easily.

[0092] Drawing 13 and drawing 14 show other examples of the regulation means in the rotation output unit 10. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 and another example shown by drawing 9 - drawing 12 is attached, and the detailed explanation is omitted.

[0093] Like the 1st example and another example which were mentioned above, although the regulation means in this example constitutes by the regulation crevice 42 and the regulation heights 43 of the snap arm 44 of a snap ring 22 The location which constitutes this regulation means is formed in the opposite section of the end face of a lock ring 25, and the output shaft 28 corresponding to this location, and further, the regulation crevice 42 is made to correspond to forward rotation and inverse rotation, and is formed in one place.

[0094] In addition, the snap ring 22 is using the snap rings 22a and 22b of two sheets which reversed the direction of the snap arms 44a and 44b like another example shown by above-mentioned drawing 9 - drawing 12.

[0095] moreover, the hole of a lock ring 25 — the conditions same to fitting of the type connection section 35 and the shaft form connection section 31 of an output shaft 28 as (drawing 11, refer to drawing 12), and the another above-mentioned example — the hole of a lock ring 25 — it plays in the type connection section 35, and angle beta is formed.

[0096] The partition projection 36 of the above-mentioned lock ring 25 Since this lock ring 25 is set as the mid-position of the range which operates the wedge rollers 24a and 24b corresponding to forward rotation and inverse rotation The regulation crevice 42 which made the end face of this partition projection 36 correspond to forward rotation and inverse rotation by one is formed using being in this mid-position, and the regulation heights 43a and 43b of snap rings 22a and 22b are made to engage with this regulation crevice 42. That is, the lock ring 25 will carry out location regulation from the output-shaft 28 side by the energization force of the snap arms 44a and 44b of snap rings 22a and 22b.

[0097] If according to this example the drive of Motor M is stopped and an output shaft 28 continues rotation by inertia, a lock ring 25 operates the wedge rollers 24a or 24b corresponding to the method opposite side of rotation, and locks rotation of an output shaft 28. Furthermore, since it buffers according to the energization force of the snap arms 44a and 44b of the snap rings 22a and 22b which are carrying out location regulation of the lock ring 25, the inertia at the time of this lock (or impact) does not have generating of the impact and impulsive sound accompanying a rigid halt, and can be stopped easily.

[0098] Furthermore, even if it is the case that the inertia (or impact) produced with an above-mentioned lock is larger than the energization force of the snap arms 44a and 44b and the regulation heights 43 jump out from the regulation crevice 42. Since the operation of braking and the buffer by the energization force of the snap arms 44a and 44b is still working to the turning effort by the inertia, rotation by the inertia by the side of an output shaft 28 declines at an early stage, and it is regulated by the regulation location, and can be made to stop calmly.

[0099] Drawing 15 and drawing 16 show other examples of lock device 10b in the rotation output unit 10, and are omitting about the configuration of a regulation means. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 and the example of others which were already explained is attached, and the detailed explanation is omitted.

[0100] In this example, three brake-shoes 91 — of the same structure which carried out equal arrangement is infixed between the inner skin 39 of a stop ring 27, and the peripheral face of a lock ring 25. This brake shoe 91 is formed with a metal or the ingredient suitable for a braking operation, and when an ingredient is a metal, the thing of that peripheral face and inner skin 39 of a stop ring 27 for which it is alike, respectively, small irregularity is formed, and frictional resistance is enlarged is also possible for it.

[0101] The inverted cam 92 of the shape of a crest operated in an inside center section from the both directions by the side of forward rotation and inverse rotation of each above-mentioned brake-shoe 91 — is formed.

[0102] Moreover, the cam sides 93a and 93b for making an inverted cam 92 correspond and operating it from a this forward rotation and inverse rotation side of above-mentioned brake-shoe 91 — are formed in the peripheral face of a lock ring 25.

[0103] moreover — the hole form connection section 35 of the core of a lock ring 25 — fitting with the shaft form connection section 31 of an output shaft 28 — setting (referring to drawing 11 and drawing 12) — the same conditions as the another above-mentioned example — the hole of a lock ring 25 — it plays in the type connection section 35, and angle beta is formed.

[0104] The forward rotation or inverse rotation from an output-shaft 28 side is locked by the cam sides' 93a and 93b pushing up the inverted cam 92 of a brake shoe 91 by forward rotation of the above-mentioned lock ring 25, or rotation of inverse rotation, and carrying out the pressure welding of the inner skin 39 of a stop ring 27 for the peripheral face of this brake shoe 91. Of course, this lock and lock discharge are performed within the play angle alpha of a carrier 15 and an output shaft 28.

[0105] Each above-mentioned brake shoe 91 — In between, the release projection 41 is infixed and this release projection 41 — is each brake shoe 91, at the time of the drive from a carrier 15 side. — An each end face is contacted and these pressure weldings are canceled.

[0106] While forming concave convex the engagement heights 95 and the engagement crevice 96, when these engagement heights 95 and engagement crevices 96 are engaged, the formation location is set to each edge of the above-mentioned release projection 41 and the brake shoe 91 which counters this edge so that the peripheral face of a brake shoe 91 may regulate in the location distant inside the inner skin 39 of a stop ring 27.

[0107] The shaft-like pin 94 is implanted in the center of a side face of the above-mentioned brake shoe 91, and the output shaft 28 (outside of drawing) and the retaining ring 23 which rotates in one are opposite-~~ed~~ to this brake shoe 91, and location regulation of the above-mentioned pin 94 is carried out with the arms 73 and 73 of the pair which this retaining ring 23 counters.

[0108] That is, when the engagement crevices 97 and 97 which engage with the above-mentioned pin 94 are formed and these engagement crevices 97 and 97 and pins 94 are engaged, the formation location is set to the opposite section of the above-mentioned arms 73 and 73 so that the peripheral face of a brake shoe 91 may regulate in the location distant inside the inner skin 39 of a stop ring 27.

[0109] When the pressure welding (lock condition) to the stop ring 27 of the above-mentioned brake shoe 91 cannot avoid by press discharge of the cam sides 93a and 93b of a lock ring 25, the engagement heights 95 of the edge of the release projection 41 engage with the engagement crevice 96 of the near BURIKI shoe 91 corresponding to a lock, and cancel the lock of this brake shoe 91.

[0110] To coincidence, the peripheral face of a brake shoe 91 is detached from the inner skin 39 of a stop ring 27 in above-mentioned engagement actuation. Further The pin 94 of this brake shoe 91, The engagement crevice 97 of the arm 73 of the retaining ring 23 which carries out engagement correspondence engages with this. The center section of the brake shoe 91 also detaches the peripheral face from the inner skin 39 of a stop ring 27, the periphery section will be in the condition of having been supported in the state of non-contact, about two places of one edge and a center section, and lock discharge of the brake shoe 91 will be carried out. This permits the drive from Motor M side. Therefore, the slide contact sound of a brake shoe 91 is avoided at the time of a drive.

[0111] Thus, lock device 10B can also be constituted. In addition, it comes out of a regulation means to use it for lock device 10B of this example to use all of a configuration of that the configuration explained by drawing 9 and drawing 10 and drawing 13, and drawing 14 explained.

[0112] In the configuration of this invention, and correspondence with an above-mentioned example the rotation driving member of this invention It corresponds to the carrier 15 of an example. Like the following a rotation output member It corresponds to an output shaft 28 and a holddown member corresponds to a stop ring 27. A lock member It corresponds to the wedge roller 24 and a brake shoe 91. A lock operating member It corresponds to a lock ring 25. A release member It corresponds to the release projection 41 of the release ring 21. A regulation means It corresponds to the regulation heights 43 and the regulation crevice 42 of the snap arm 44 of a snap ring 22. An operating cam side It corresponds to the inverted cam 92 of a brake shoe 91, and the cam side 93 of a lock ring 25. Supporter material Corresponding to a retaining ring 23, an elastic member 71, and an arm 73, ** corresponding to the engagement section 64, a pin 87, and the buffer member 88 in the buffer member of a fixed means and this invention are not limited only to the configuration of an example, and are equipped with the gestalt of many operations.

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TECHNICAL FIELD

[The technical field to which invention belongs] In a power tool like for example, a transmission driver, this invention relates to the rotation output unit which can lock this output shaft, when carrying out halt control of the motor and stopping that output shaft.

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PRIOR ART

[Description of the Prior Art] Conventionally, as what was equipped with the function which locks the output shaft when halt control of the motor is carried out in the power tool of the above-mentioned example, the rotation tool of an indication is in JP,6-53350,B, for example.

[0003] However, the projection formed on the periphery of the input shank material into which the tool of this conventional technique inputs driving force, A making [into 1 set]-pair which it had [pair] play in predetermined include angle, and made the projection formed on periphery of output shaft which outputs turning effort correspond in forward hand-of-cut and direction of inverse rotation among both projections within connection condition, and nothing and this play angle roller, The wedge effectiveness inclined plane of 1 set of pair which is made to correspond in an above-mentioned forward hand of cut and the above-mentioned direction of inverse rotation, and is locked by the wedge effectiveness is formed in an output-shaft side, and the lock device is constituted.

[0004] By the device, conventionally [this] transfer of the turning effort from input shank material Driving force is transmitted to the projection by the side of the projection by the side of input shank material, a roller, and an output shaft at an output shaft, canceling the lock condition of a lock device. When transmit a forward or reverse turning effort, rotation of input shank material is stopped, an output shaft is manually etc. played in the forward or reverse direction and a part for an angle is rotated, an above-mentioned roller bites to the wedge effectiveness inclined plane corresponding to a hand of cut, and rotation is locked by the wedge effectiveness.

[0005] Therefore, since this lock will act by performing forward or reverse rotation for a play angle of an output shaft although an output shaft will be in the condition that it can lock however if the drive of input shank material is stopped, the following trouble arises by rotation for this play angle.

[0006] Namely, when working by attaching the disc-like body of revolution of others, the high tool, for example, the hole saw, of a rotation load, in an above-mentioned output shaft through a chuck, Although a lock tends to act and it is also going to suspend rotation of a tool after a tool played and rotates by the angle since a tool tends to continue rotation by the inertia, if halt control of the motor is carried out as mentioned above, the drive of input shank material is stopped and rotation of an output shaft is stopped By being locked suddenly and stopped, without the rotation from a tool side making it brake An impact arises in a lock member (the above-mentioned roller) and the member (the projection by the side of the above-mentioned input shank material, projection by the side of an output shaft) which touches this, and a loud impulsive sound whose big impact load is applied to these members both occurs.

[0007] Moreover, although this lock will be removed by that counteraction, a tool will be played with and rotated by the angle to hard flow and a lock will act in the wedge operation by the side of this inversion direction again when it stops rapidly as mentioned above However, since the chattering phenomenon in which rotation of an above-mentioned forward inversion is continued two or more times, and repeats forward inverse rotation to an output shaft will arise and this phenomenon will be shockingly produced according to the inertia of a tool being large if the inertia produced in an above-mentioned tool is large With generating of the chattering by loud impulsive sound, it becomes the trouble which invites the breakage and damage on an internal configuration element.

[0008] Moreover, since it is transmitted to the projection by the side of the projection by the side of input shank material, a roller, and an output shaft and a roller is pressed by projection by the above-mentioned conventional device as transfer of the turning effort from input shank material mentioned above If it will be in the condition of the viscosity of these projections [rollers or projections] for oiliness of grease etc. increasing by secular use, and being easy to paste them up, it will become the trouble that a roller will be fixed to a projection, this roller will not move to the location where a lock acts, and a lock does not act also where press of a roller is canceled.

[Translation done.]

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EFFECT OF THE INVENTION

[Function and Effect of the Invention] According to this invention, the lock operating member of a lock device is regulated by the energization force of a regulation means by the energization force at a position through a rotation driving member, a rotation output member, and a rotation output member.

[0028] By this, work by attaching the disc-like body of revolution of others, the high tool, for example, the hole saw, of a rotation load, in a rotation output member through a chuck, for example, a motor is suspended. When the drive of a rotation driving member is stopped and rotation of a rotation output member is stopped, the energization force of a regulation means gives braking and an operation of a buffer to the turning effort by ** to which a rotation output member tends to continue rotation by that inertia, and this inertia. Since it regulates in a regulation location, it can **, if there is no generating of the impact and impulsive sound accompanying a rapid halt, it is muffled and ** is stopped.

[0029] Furthermore, it is the case that the inertia of an above-mentioned rotation output member is large than the energization force of a regulation means, and since an operation of braking and the buffer by the energization force of a regulation means is still keeping on working in this turning effort even if it jumps out of the once regulated regulation location, it decreases at an early stage and it is regulated by the regulation location, and there is nothing in generating of a chattering, and the turning effort by inertia is muffled and is stopped by **.

[0030] Therefore, there is no generating of the impact and impulsive sound accompanying a halt of a rotation driving member, and ** can be stopped, and the breakage and damage on an internal configuration element based on an above-mentioned impact can be prevented.

[0031] Furthermore, since the turning effort of the output driving mechanism by the rotation driving member and the rotation output member is not applied to a lock device as a load, it can be lost that the lock member of this lock device is pressed by the member by the side of lock discharge, and fixes, and a lock operation of a lock member can be made to always perform smoothly.

[0032]

[Embodiment of the Invention] The gestalt of 1 implementation of this invention is explained with a drawing below. An example shows the rotation output unit used for the power tool of a hand type, and the above-mentioned rotation output unit 10 is formed in the output side latter part of the motor M which carries out a forward inversion in drawing 1.

[0033] The epicyclic gear moderation device 12 is connected to the motor shaft 11 of the above-mentioned motor M. This epicyclic gear moderation device 12 The planet gear 14 which gears with a sun gear 13 and this sun gear 13, and the carrier 15 which supported this planet gear 14 to revolve, The internal gear 16 which gears with a planet gear 14, and the stop ring 17 which holds this internal gear 16 rotatable constitute, and these are the transmission elements of a rotation transmission system, it has a moderation function as everyone knows, and the moderation output is outputted from a carrier 15.

[0034] Moreover, spline fitting etc. inserted in each other's above-mentioned motor shaft 11, and it is connected using structure so that rotation may be transmitted to the sun gear 13 of the epicyclic gear moderation device 12.

[0035] The rotation output unit 10 was constituted in the latter-part side of the above-mentioned epicyclic gear moderation device 12, and this rotation output unit 10 is equipped with output driving mechanism 10A which transmits the output from the carrier 15 of the epicyclic gear moderation device 12 to an output shaft 28, and lock device 10B which locks the normal rotation or the inversion from an output-shaft 28 side, respectively as shown also in drawing 2.

[0036] Above-mentioned output driving mechanism 10A is set to a carrier 15 and an output shaft 28, as shown also in drawing 5. Form in an parallel flat surface two peripheral surfaces which counter an output shaft 28 on both sides of the axis, and the shaft form connection section 31 is formed. the hole which fits into the axis section of the carrier 15 corresponding to this with the play angle alpha of 20 angles -- a carrier 15 and an output shaft 28 are connected with the play which the turning effort for the play angle alpha is not delivered by forming the type connection section 32 and carrying out fitting of these connection sections 31 and 32.

[0037] The above-mentioned lock device 10B is equipped with the release ring 21, the retaining rings 22 and 23 of 22 or 2 snap rings, the wedge roller 24, a lock ring 25, a rubber ring 26, and a stop ring 27 as shown also in drawing 2, drawing 3, and drawing 4, and except for the wedge roller 24, each element is formed in the shape of a ring, and is arranged on the same axis.

[0038] In the tooth back of the above-mentioned release ring 21, pins 33 and 33 are formed successively on both sides of an axis in the target location, and these pins 33 and 33 rotate synchronizing with the play angle alpha by the side of a carrier 15 by engaging with the communicating pores 34 and 34 formed in the location where the carrier 15 mentioned above corresponded.

[0039] in addition, the core of the above-mentioned release ring 21 -- the hole of a carrier 15 -- the same hole as the type connection section 32 -- the type connection section is formed and fitting of the shaft form connection section 31 of an output shaft 28 is carried out to this.

[0040] The above-mentioned lock ring 25 forms the hole form connection section 35 for it being in agreement without the shaft form connection section 31 of the above-mentioned output shaft 28, and play, fitting into the axis section, and an output shaft 28 being interlocked with. It divides into the location (location of 120 angles spacing) of three places which carried out equal arrangement at the periphery section, and projection 36 -- is formed. This partition projection 36 -- moreover, on circumferential direction both sides It is made to correspond to forward rotation of an output shaft 28 and inverse rotation, and wedge inclined plane 37a -- and 37b -- which made the projection 36 side low are formed.

[0041] The shape of a roll is made to correspond to nothing and the wedge inclined planes 37a and 37b of the above-mentioned lock ring 25. the above-mentioned wedge roller 24 arranges it, therefore this wedge roller 24 makes a pair two pieces made to

correspond to forward inverse rotation, 3 sets is used, and the above-mentioned partition projection 36 and the wedge inclined planes 37a and 37b are also formed corresponding to these 3 sets.

[0042] Moreover, the die length of the wedge roller 24 is formed for a long time than the width of face (thickness) of a lock ring 25, and is supported with the retaining rings 23 and 23 before and after mentioning the both ends above.

[0043] Therefore, support projection 38 — is formed in the location (location of 120 angles spacing) of three places which carried out equal arrangement at the periphery section of each of retaining rings 23 and 23, and one pair of wedge rollers 24 and 24 of the above-mentioned in circumferential direction both sides of this support projection 38 — are supported. In addition, the core of retaining rings 23 and 23 is formed in a circle configuration.

[0044] The above-mentioned rubber ring 26 is the wedge roller 24 supported as mentioned above. — It touches outside and rotation is given to wedge roller 24 — of each [this frictional resistance].

[0045] If the inner skin 39 which an above-mentioned lock ring 25 and above-mentioned retaining rings 23 and 23 can contain is formed and put in another way, the above-mentioned stop ring 27 in radial, inner skin 39 and the peripheral face of a lock ring 25 (and output shaft 28) will separate predetermined spacing, and will counter. It is spacing to which the wedge roller 24 of the above-mentioned pair and 24 — may be located between the wedge inclined planes 37a and 37b of the pair of a lock ring 25, and the above-mentioned inner skin 39. And the wedge inclined planes 37a and 37b are set as spacing from which the wedge rollers 24 and 24 separate from the location locked (a pressure welding carried out) and this **** lump location (a pressure-welding location or lock location) and which bites, and they can move to the location of lock discharge.

[0046] In addition, the width of face of the circumferential direction of the support projection 38 of the above-mentioned retaining rings 23 and 23 is set as the width of face which the wedge rollers 24 and 24 support in the location of lock discharge.

[0047] Release projection 41 — which performs lock discharge of the above-mentioned wedge rollers 24 and 24 is carrying out connection formation on the side face of the release ring 21 mentioned above.

[0048] That is, it is made to correspond to 3 sets of wedge roller 24 —, and above-mentioned release projection 41 — is arranged in the location (location of 120 angles spacing) of three places which carried out equal arrangement at the wedge rollers 24 and 24 of the release ring 21, and the side which counters.

[0049] In the play angle α of the release ring 21 and output shaft 28 which pressed the wedge rollers 24 and 24 which correspond by each end face of that circumferential direction to the hand of cut, and performed lock discharge, and mentioned the operation of this lock discharge above, the above-mentioned release projection 41 has set up the width of face (or die length) of the circumferential direction of the release projection 41 so that an operation of lock discharge may be especially completed at the both ends of this play angle α .

[0050] Above-mentioned release projection 41 — is equipped with the regulation means for regulating this by the energization force when the location side of the lock discharge corresponding to forward rotation or inverse rotation has this release projection 41.

[0051] That is, forward rotation and inverse rotation are made to correspond to the field by the side of the axis of the above-mentioned release projection 41, and the regulation crevices 42a and 42b are formed.

[0052] It has prepared in the above-mentioned regulation crevices 42a and 42b so that it may be engaged in the condition of having energized by the energization force in which the regulation heights 43 of the snap ring 22 mentioned above were set up.

[0053] The above-mentioned regulation heights 43 are the snap arms 44 which the circumferential direction of the same direction was made to extend and were formed from the location of three places on the periphery of a snap ring 22 which carried out equal arrangement. — It forms in the free end section. Furthermore, relative-position relation is set up so that it may be engaged, when the regulation crevices 42a and 42b are located in the location of lock discharge, respectively, and the energization force is set as the energization force a little smaller than the driving force by the side of Motor M while acquiring it with the ingredient elasticity produced on the snap arm 44. In addition, a setup of the above-mentioned energization force is because the change of the regulation projection 43 is enabled on another side from one side of the regulation crevices 42a and 42b, when Motor M is rebooted.

[0054] Moreover, the core of the above-mentioned snap ring 22 forms the connection section so that it may fit in with the shaft form connection section 31 of an output shaft 28 and may rotate in one.

[0055] Among drawing, 45 are a lid ring, by attaching in a stop ring 27, contain each component to a stop ring 27, and carry out unitization of the rotation output unit 10 to it. The torque limiter is constituted by the above-mentioned epicyclic gear moderation device 12.

[0056] As shown in drawing 1 and drawing 6, in the above-mentioned epicyclic gear moderation device 12, it supports possible [idling] to a stop ring 17, and the outer edge of this internal gear 16 forms the concave convex 50 which follows a circumferential direction, and the internal gear 16 carries out the pressure welding of the ball 51 to this, presses the internal gear 16 to a stationary-plate 52 side, it is regulating the rotation and constitutes the torque limiter.

[0057] Plurality (for example, six pieces) opposite-** the above-mentioned ball 51 on the internal gear 16 on a periphery. A holddown member 53 is opposite-**(ed) in the outer edge of this internal gear 16, and the location which counters. They are the above-mentioned internal gear 16 of this holddown member 53, and the side which counters. The spring 55 for forming the receipt hole 54 in the above-mentioned ball 51 and a corresponding location, and pressing the above-mentioned ball 51 is contained, the support pin 57 of the receptacle member 56 is inserted, and the outer edge of this spring 55 is held.

[0058] The screw 58 by the square thread can be formed in the periphery section for a narrow diameter portion of the above-mentioned holddown member 53, the nut member 59 can screw in this screw 58, the above-mentioned receptacle member 56 can be moved for the attitude of this nut member 59 to shaft orientations through a ball 60 and a ring 61, and the above-mentioned ball 51 and the torque of the torque limiter by the concave convex 50 of the internal gear 16 can be adjusted by adjusting the elasticity of a spring 55.

[0059] In addition, the above-mentioned nut member 59 can be connected so that rotation may be transmitted like spline fitting as opposed to the actuation covering 62, where sliding to shaft orientations is permitted, and rotation actuation of the nut member 59 can be carried out by carrying out rotation actuation of the actuation covering 62. Moreover, a stationary plate 52, a stop ring 17, and a holddown member 53 are connected with the outside case 63 in one with a proper configuration, and are constituted in the fixed condition.

[0060] And the stop ring 27 of the rotation output unit 10 mentioned above is stopped by the above-mentioned holddown member 53 through the stop section 64, and rotation is fixed. In addition, the stop section 64 can also be constituted so that it may form with a pin-like object and may insert in a pore. An operation of the rotation output unit 10 mentioned above next is explained

[0061] In drawing 4, if forward rotation of the motor M is carried out and the carrier 15 and the release ring 21 of the epicyclic gear moderation device 12 are rotated to a hand of cut X, wedge roller 24a which corresponds by the end face of the method opposite side of rotation of the release projection 41 will be stuffed into the lock discharge location of wedge inclined plane 37a of a lock ring 25. On the other hand, wedge roller 24b of another side is contacted with the inner skin 39 of a stop ring 27, and this wedge roller 24b is pushed in the lock discharge location of wedge inclined plane 37b by the contact resistance.

[0062] after such lock discharge was completed within the play angle α of a carrier 15 and an output shaft 28 and the lock was canceled — the hole of a carrier 15 — since the type connection section 32 and the shaft form connection section 31 of an output shaft 28 will be in a interlocking condition, the driving force of a carrier 15 is transmitted to an output shaft 28, and can rotate this.

[0063] At this time, the regulation heights 43 of the snap arm 44 engage with regulation crevice 42a of the release projection 41, the release ring 21 and a lock ring 25 are the location where the lock was canceled, or the location of one edge of the play angle α , and location regulation will be carried out by the energization force of the snap arm 44.

[0064] In addition, at the time of an above-mentioned drive, it is only that the force required for pushing into the location of lock discharge of wedge roller 24a acts, and the release projection 41 of the release ring 21 does not require a big load for this wedge roller 24a.

[0065] If the drive by Motor M is stopped in the above-mentioned condition, the regulation heights 43 of the snap arm 44 will engage with regulation crevice 42a of the above-mentioned release projection 41, and a carrier 15 and an output shaft 28 will stop with the condition that location regulation was carried out by the energization force of the snap arm 44.

[0066] At this time, a tool is attached in an output-shaft 28 side, when the inertia of this tool is smaller than the energization force of the snap arm 44, it is braked and buffered by this energization force, and a halt is possible for ** in an above-mentioned regulation location.

[0067] Moreover, although inertia overcomes the energization force of the snap arm 44 and the regulation heights 43 engage with regulation crevice 42b of another side when the inertia of an above-mentioned tool is larger than the energization force of the snap arm 44. When engagement to previous regulation crevice 42a separates [this regulation projection 43], in order that that resistance may serve as a braking operation and buffer action and may act on inertial force, this inertial force is decreased at an early stage, and engages with the following regulation crevice 42b, and rotation of the output shaft 28 by inertia stops.

[0068] Thus, since the rotation by the inertia of a tool is regulated by engagement to the regulation crevices 42a and 42b and the regulation heights 43 of the snap arm 44, neither the impact of a member nor generating of impulsive sound is at the time of a halt, and a chattering phenomenon is also avoided, and it can stop in the condition of having been muffled.

[0069] For example, if Motor M is suspended when there is no above-mentioned regulation means (the regulation crevices 42a and 42b, the regulation heights 43, snap arm 44) The support projection 38 of retaining rings 23 and 23 or the partition projection 36 of a lock ring 25 pushes wedge roller 24b by inertia rotation of an output shaft 28 according to the inertia of a tool, and it is made to collide with the edge of the release projection 41. Moreover, retaining rings 23 and 23 and a lock ring 25 carry out inverse rotation by the counteraction, and wedge roller 24a of another side is made to collide with the other-end side of the release projection 41. An impact strong against a member will be given by these collisions, and a still louder impulsive sound will be generated. Moreover, if the inertial force of a tool is large, above-mentioned actuation will be repeated, it will be continued two or more times, and a chattering phenomenon will occur.

[0070] In this example, such a chattering phenomenon, the above-mentioned impact, and generating of impulsive sound can be regulated by engagement of the regulation crevices 42a and 42b and the regulation heights 43 of the snap arm 44, and can be prevented.

[0071] If the forward inversion of this is carried out from an output-shaft 28 side in the condition that the above-mentioned motor M has stopped, the function of lock device 10B will act on this output shaft 28, it will be locked, and the rotation will be suspended.

[0072] That is, if an output shaft 28 is rotated in the forward or reverse direction, the wedge rollers 24a or 24b corresponding to the direction will touch the inner skin 39 of a stop ring 27, it will bite by the contact resistance to this inner skin 39 and the wedge inclined planes 37a or 37b of a lock ring 25 (pressure welding), and each hand of cut will be locked.

[0073] At the time of an above-mentioned lock, when attaching a chuck in an output shaft 28, in addition when [where Motor M is suspended,] carrying out rotation actuation of the power tool, an effective activity can be performed.

[0074] Since one wedge roller 24a is stuffed into a lock discharge location by the end face of the method opposite side of rotation of the release projection 41 and wedge roller 24b of another side is pushed in a lock discharge location by the inner skin 39 of a stop ring 27, and contact when Motor M is rebooted, the drive of an output shaft 28 is attained.

[0075] In addition, since the rubber ring 26 touches this wedge roller 24 — when an output shaft 28 drives and wedge roller 24 — revolves around the sun, it rotates, while wedge roller 24 — revolves around the sun by this contact resistance, and according to an operation of this rotation, an axis is the axis of an output shaft 28, and always maintained at parallel, and the thing of wedge roller 24 — to incline is prevented.

[0076] Drawing 7 shows other examples of the retaining ring 23 of the rotation output unit 10 mentioned above. Although supported by the support projection 38 of a retaining ring 23 in the 1st example in the location of lock discharge of the wedge rollers 24a and 24b, it is supporting in this example in the crevices 71a and 71b of the elastic member 71 which forms with piano wire rods and has elasticity.

[0077] The curve base is carrying out attachment maintenance of the above-mentioned elastic member 71 in the crevice 72 formed corresponding to the retaining ring 23. in addition, the core of a retaining ring 23 — the hole of an output shaft 28 — it forms in the configuration corresponding to the type connection section. however, a circle configuration — it is also — it is good.

[0078] Although the location which the above-mentioned wedge rollers 24a and 24b support is set as the location of lock discharge of the wedge rollers 24a and 24b like the 1st above-mentioned example, this location is equivalent also to the location just before each of the wedge rollers 24a and 24b carries out a **** operation. moreover — since it is supporting with elasticity — the elasticity by the side of lock discharge — it is also permitting a variation rate.

[0079] Thus, if it contacts so that the release projection 41 may carry out lock discharge when elastic support is carried out and the wedge rollers 24a and 24b are in a lock condition, elastic displacement can be carried out and the **** impact can be buffered.

[0080] Drawing 8 shows other examples of the retaining ring 23 of the rotation output unit 10 mentioned above. Although attachment maintenance was carried out and the elastic member 71 which forms in a retaining ring 23 with piano wire rods and

has elasticity was constituted from an example of above-mentioned drawing 7, the wedge rollers 24a and 24b are supported in this example in the crevices 74a and 74b formed in the edge of the arm 73 formed so that predetermined elasticity might arise to a retaining ring 23. in addition, this retaining ring 23 — a metal plate or synthetic resin — forming — moreover, that core — the hole of a carrier 15 — it forms in the configuration corresponding to the type connection section. however, a circle configuration — it is also — it is good.

[0081] Thus, even if constituted, an operation and effectiveness equivalent to the retaining ring 23 shown by drawing 7 can be acquired.

[0082] Drawing 9 - drawing 12 show other examples of the regulation means in the rotation output unit 10. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 is attached, and the detailed explanation is omitted.

[0083] Like the 1st example mentioned above, although the regulation means in this example constitutes by the regulation crevices 42a and 42b and the regulation heights 43 of the snap arm 44 of a snap ring 22 Forming in the location of the end face of the carrier 15 of the epicyclic gear moderation device 12, and the output shaft 28 corresponding to this location the part which constitutes this regulation means, the snap ring 22 is using further the snap rings 22a and 22b of two sheets which the snap arm 44 reversed.

[0084] Namely, the receipt crevice 82 which had the inner skin 81 which the snap rings 22a and 22b of two sheets can contain in the outside end face of a carrier 15 is formed. The regulation crevices 42a and 42b made to correspond to forward rotation and inverse rotation are formed in the location of three places as for which the inner skin 81 of this receipt crevice 82 carried out equal arrangement in the location of lock discharge of the lock device by the wedge rollers 24a and 24b and the wedge inclined planes 27a and 27b of a lock ring 25.

[0085] The snap rings 22a and 22b contained to the above-mentioned receipt crevice 82 One kind of snap ring 22 which formed the regulation heights 43 in the free end section of the snap arm 44 which extended from the peripheral face of one snap ring 22 to the circumferential direction, and set up the energization force two sheets 22a and 22b The polymerization of the extension direction of each snap arm 44a and 44b was carried out and carried out in the opposite direction, the regulation heights 43a and 43b were piled up, and this piled-up regulation heights 43a and 43b ** are engaged and included in one regulation crevices 42a or 42b.

[0086] Thus, if it is made to act from the direction which carries out the polymerization of the snap rings 22a and 22b, and conflicts the snap arms 44a and 44b, buffer actuation (snap action) corresponding to the forward rotation side of a regulation means and an inverse rotation side can be made into the same conditions. For example, in the 1st example, since (referring to drawing 4) and the snap ring 22 of one sheet are used, if the regulation projection 43 of the snap arm 44 receives a load from the direction of the free end side of the snap arm 44, this load will be received strongly, but when a load is received from the direction of the root side of the snap arm 44, it becomes smooth actuation and buffer actuation (snap action) differs by forward rotation and inverse rotation.

[0087] However, in this example, since the snap arms 44a and 44b of the direction which is different from each other are carrying out the polymerization as mentioned above and the actuation corresponding to each forward rotation and inverse rotation acts on one regulation crevice 42, the buffer actuation corresponding to forward rotation and inverse rotation serves as the same conditions. Of course, the snap ring 22 of the 1st example mentioned above can also be constituted using the snap rings 22a and 22b of two sheets which conflict as mentioned above.

[0088] The flange 83 is formed in the periphery section which counters the carrier 15 of the above-mentioned release ring 21. Form engagement heights 84 — in the location of three places as for which this flange 83 carried out equal arrangement, and a step 85 is formed in the periphery section of a carrier 15 corresponding to this. Engagement crevice 86 — is formed in the location corresponding to above-mentioned engagement heights 84 —. attaching a flange 83 in a step 85 in the condition of having made engagement crevice 86 — engaging with these engagement heights 84 — the release ring 21 and a carrier 15 can be attached in one, where a baffle is carried out. Of course, the snap rings 22a and 22b of two sheets are included as mentioned above in this attachment by the receipt crevice 82.

[0089] In drawing 11, the retaining ring 23 equipped with the elastic arms 73 and 73 shown by drawing 8 is used for the retaining ring 23 which supports the wedge rollers 24a and 24b.

[0090] Moreover, concave stop section 64 — is formed in the location of two or more places as for which the periphery section of a stop ring 27 carried out equal arrangement, and although this concave stop section 64 — engages with the holddown member 53 shown by drawing 1 in the state of a baffle, in this example, it implants pin 87 — in a holddown-member 53 side, and engages with this through buffer member 88 — which has another rubber material and buffer function. That is, at the time of a lock operation of the wedge rollers 24a and 24b, that impact is transmitted also to a holddown member 27; and since it becomes the load made to rotate this, this impact load can be buffered by the above-mentioned buffer member 88.

[0091] drawing 12 — setting — the hole of a lock ring 25 — to fitting of the type connection section 35 and the shaft form connection section 31 of an output shaft 28 The type connection section 35 plays and angle beta is formed. the shaft form connection section 31 of an output shaft 28 — receiving — the hole of a lock ring 25 — this play angle beta the hole of a carrier 15 — it is set as an angle (for example, ten angles) smaller than the play angle alpha of the type connection section 32 and the shaft form connection section 31 of an output shaft 28 (for example, 20 angles). The play angle beta in this example is a setup for making attachment by the shaft form connection section 31 of an output shaft 28 perform easily.

[0092] Drawing 13 and drawing 14 show other examples of the regulation means in the rotation output unit 10. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 and another example shown by drawing 9 - drawing 12 is attached, and the detailed explanation is omitted.

[0093] Like the 1st example and another example which were mentioned above, although the regulation means in this example constitutes by the regulation crevice 42 and the regulation heights 43 of the snap arm 44 of a snap ring 22 The location which constitutes this regulation means is formed in the opposite section of the end face of a lock ring 25, and the output shaft 28 corresponding to this location, and further, the regulation crevice 42 is made to correspond to forward rotation and inverse rotation, and is formed in one place.

[0094] In addition, the snap ring 22 is using the snap rings 22a and 22b of two sheets which reversed the direction of the snap arms 44a and 44b like another example shown by above-mentioned drawing 9 - drawing 12.

[0095] moreover, the hole of a lock ring 25 — the conditions same to fitting of the type connection section 35 and the shaft form connection section 31 of an output shaft 28 as (drawing 11, refer to drawing 12), and the another above-mentioned example — the hole of a lock ring 25 — it plays in the type connection section 35 and angle beta is formed

[0096] The partition projection 36 of the above-mentioned lock ring 25 Since this lock ring 25 is set as the mid-position of the range which operates the wedge rollers 24a and 24b corresponding to forward rotation and inverse rotation The regulation crevice 42 which made the end face of this partition projection 36 correspond to forward rotation and inverse rotation by one is formed using being in this mid-position, and the regulation heights 43a and 43b of snap rings 22a and 22b are made to engage with this regulation crevice 42. That is, the lock ring 25 will carry out location regulation from the output-shaft 28 side by the energization force of the snap arms 44a and 44b of snap rings 22a and 22b.

[0097] If according to this example the drive of Motor M is stopped and an output shaft 28 continues rotation by inertia, a lock ring 25 operates the wedge rollers 24a or 24b corresponding to the method opposite side of rotation, and locks rotation of an output shaft 28. Furthermore, since it buffers according to the energization force of the snap arms 44a and 44b of the snap rings 22a and 22b which are carrying out location regulation of the lock ring 25, the inertia at the time of this lock (or impact) does not have generating of the impact and impulsive sound accompanying a rapid halt, and can be stopped calmly.

[0098] Furthermore, even if it is the case that the inertia (or impact) produced with an above-mentioned lock is larger than the energization force of the snap arms 44a and 44b and the regulation heights 43 jump out from the regulation crevice 42 Since the operation of braking and the buffer by the energization force of the snap arms 44a and 44b is still working to the turning effort by the inertia, rotation by the inertia by the side of an output shaft 28 declines at an early stage, and it is regulated by the regulation location, and can be made to stop calmly.

[0099] Drawing 15 and drawing 16 show other examples of lock device 10b in the rotation output unit 10, and are omitting about the configuration of a regulation means. In addition, the sign same about a component with the same function as the 1st example shown by drawing 1 - drawing 5 and the example of others which were already explained is attached, and the detailed explanation is omitted.

[0100] In this example, three brake-shoes 91 — of the same structure which carried out equal arrangement is infixed between the inner skin 39 of a stop ring 27, and the peripheral face of a lock ring 25. This brake shoe 91 is formed with a metal or the ingredient suitable for a braking operation, and when an ingredient is a metal, the thing of that peripheral face and inner skin 39 of a stop ring 27 for which it is alike, respectively, small irregularity is formed, and frictional resistance is enlarged is also possible for it.

[0101] The inverted cam 92 of the shape of a crest operated in an inside center section from the both directions by the side of forward rotation and inverse rotation of each above-mentioned brake-shoe 91 — is formed.

[0102] Moreover, the cam sides 93a and 93b for making an inverted cam 92 correspond and operating it from a this forward rotation and inverse rotation side of above-mentioned brake-shoe 91 — are formed in the peripheral face of a lock ring 25.

[0103] moreover — the hole form connection section 35 of the core of a lock ring 25 — fitting with the shaft form connection section 31 of an output shaft 28 — setting (referring to drawing 11 and drawing 12) — the same conditions as the another above-mentioned example — the hole of a lock ring 25 — it plays in the type connection section 35, and angle beta is formed.

[0104] The forward rotation or inverse rotation from an output-shaft 28 side is locked by the cam sides' 93a and 93b pushing up the inverted cam 92 of a brake shoe 91 by forward rotation of the above-mentioned lock ring 25, or rotation of inverse rotation, and carrying out the pressure welding of the inner skin 39 of a stop ring 27 for the peripheral face of this brake shoe 91. Of course, this lock and lock discharge are performed within the play angle alpha of a carrier 15 and an output shaft 28.

[0105] Each above-mentioned brake shoe 91 — In between, the release projection 41 is infixed and this release projection 41 — is each brake shoe 91 at the time of the drive from a carrier 15 side. — An each end face is contacted and these pressure weldings are canceled.

[0106] While forming concave convex the engagement heights 95 and the engagement crevice 96, when these engagement heights 95 and engagement crevices 96 are engaged, the formation location is set to each edge of the above-mentioned release projection 41 and the brake shoe 91 which counters this edge so that the peripheral face of a brake shoe 91 may regulate in the location distant inside the inner skin 39 of a stop ring 27.

[0107] The shaft-like pin 94 is implanted in the center of a side face of the above-mentioned brake shoe 91, and the output shaft 28 (outside of drawing) and the retaining ring 23 which rotates in one are opposite-*(ed) to this brake shoe 91, and location regulation of the above-mentioned pin 94 is carried out with the arms 73 and 73 of the pair which this retaining ring 23 counters.

[0108] That is, when the engagement crevices 97 and 97 which engage with the above-mentioned pin 94 are formed and these engagement crevices 97 and 97 and pins 94 are engaged, the formation location is set to the opposite section of the above-mentioned arms 73 and 73 so that the peripheral face of a brake shoe 91 may regulate in the location distant inside the inner skin 39 of a stop ring 27.

[0109] When the pressure welding (lock condition) to the stop ring 27 of the above-mentioned brake shoe 91 cannot avoid by press discharge of the cam sides 93a and 93b of a lock ring 25, the engagement heights 95 of the edge of the release projection 41 engage with the engagement crevice 96 of the near BURIKI shoe 91 corresponding to a lock, and cancel the lock of this brake shoe 91.

[0110] To coincidence, the peripheral face of a brake shoe 91 is detached from the inner skin 39 of a stop ring 27 in above-mentioned engagement actuation. Further The pin 94 of this brake shoe 91, The engagement crevice 97 of the arm 73 of the retaining ring 23 which carries out engagement correspondence engages with this. The center section of the brake shoe 91 also detaches the peripheral face from the inner skin 39 of a stop ring 27, the periphery section will be in the condition of having been supported in the state of non-contact, about two places of one edge and a center section, and lock discharge of the brake shoe 91 will be carried out. This permits the drive from Motor M side. Therefore, the slide contact sound of a brake shoe 91 is avoided at the time of a drive.

[0111] Thus, lock device 10B can also be constituted. In addition, it comes out of a regulation means to use it for lock device 10B of this example to use all of a configuration of that the configuration explained by drawing 9 and drawing 10 and drawing 13, and drawing 14 explained.

[0112] In the configuration of this invention, and correspondence with an above-mentioned example the rotation driving member of this invention It corresponds to the carrier 15 of an example. Like the following a rotation output member It corresponds to an output shaft 28 and a holddown member corresponds to a stop ring 27. A lock member It corresponds to the wedge roller 24 and a brake shoe 91. A lock operating member It corresponds to a lock ring 25. A release member It corresponds to the release projection 41 of the release ring 21. A regulation means It corresponds to the regulation heights 43 and the regulation crevice 42 of the snap arm 44 of a snap ring 22. An operating cam side It corresponds to the inverted cam 92 of a brake shoe 91, and the cam side 93 of a lock ring 25. Supporter material Corresponding to a retaining ring 23, an elastic member 71, and an arm 73, etc.

corresponding to the engagement section 64, a pin 87, and the buffer member 88 in the buffer member of a fixed means and this invention are not limited only to the configuration of an example, and are equipped with the gestalt of many operations.

[Translation done.]

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- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention is the rotation output unit equipped with the lock device, and when a drive is stopped and a rotation output is suspended, generating of the impulsive sound made in rotation by the inertia of an output side is abolished, and an impact load is reduced, and it aims at offer of the rotation output unit which can make a lock operation always perform to coincidence smoothly.

[Translation done.]

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MEANS

[Means for Solving the Problem] This invention the rotation driving member which outputs rotation driving force, and the rotation output member which outputs turning effort in response to the drive of this rotation driving member. The output driving mechanism which a predetermined include-angle part turning effort is not delivered to a hand of cut mutual in a coaxial heart top and which was connected so that it might play, an angle might be formed and turning effort might be transmitted, Predetermined spacing is separated to radial and the holddown member which was located in the periphery section of said rotation output member and this member, and fixed rotation is opposite-**(ed) to it. Between these rotation output member and a holddown member The lock member which locks the normal rotation or the inversion from the above-mentioned rotation output member side by carrying out the pressure welding of the lock member concerned to a holddown member; The lock operating member which carries out pressure-welding actuation of the above-mentioned lock member at a holddown member by the normal rotation or the inversion from the above-mentioned rotation output member side, It has the lock device which infixed and formed the release member which cancels the pressure-welding condition of the above-mentioned lock member, and can carry out lock discharge by the normal rotation or the inversion from said rotation driving member side. Between said rotation driving member side and a rotation output member side It is characterized by being the rotation output unit which infixed a regulation means to regulate these both members of both by the energization force in a predetermined regulation location.

[0011] When according to the above-mentioned configuration the drive by the side of a rotation driving member is stopped and rotation of a rotation output member is suspended, Since the energization force of a regulation means gives braking and an operation of a buffer to ** to which this rotation output member tends to continue rotation by the inertia produced in a rotation output member side, and this turning effort and it regulates in a regulation location, there is no generating of the impact and impulsive sound accompanying a rapid halt, and it can be made to stop calmly.

[0012] Furthermore, even if it is the case that the inertia produced in the above-mentioned rotation output member is larger than the energization force of a regulation means and jumps out of the once regulated regulation location Since the operation of braking and the buffer by the energization force of a regulation means is still working to the turning effort by the inertia, it decreases at an early stage and is regulated by the regulation location, and rotation by the inertia of a rotation output member does not have generating of a chattering, and is suspended by **.

[0013] Furthermore, this invention is equipped with an above-mentioned output driving mechanism and an above-mentioned lock device. To said rotation output member, the 2nd play angle smaller than the play angle of said output driving mechanism is given, and the lock operating member of the above-mentioned lock device is attached. Between the above-mentioned lock operating member and said rotation output member It is characterized by being the rotation output unit which established a regulation means to regulate a lock operating member by the energization force to the mid-position of the range which operates said lock member corresponding to normal rotation and an inversion.

[0014] If this rotation output member continues rotation at the inertia produced in a rotation output member side when according to the above-mentioned configuration the drive by the side of a rotation driving member is stopped and rotation of a rotation output member is suspended, the lock member corresponding to the method opposite side of rotation is operated, and a lock operating member locks rotation of a rotation output member. Furthermore, since the energization force of the regulation means which is carrying out location regulation brakes a lock operating member and the inertia at the time of this lock (or impact) buffers it, it does not have generating of the impact and impulsive sound accompanying a rapid halt, and can be stopped calmly.

[0015] Furthermore, it is the case that the inertia (or impact) produced with an above-mentioned lock is larger than the energization force of a regulation means, and since the operation of braking and the buffer by the energization force of a regulation means is still working to the turning effort by the inertia even if it jumps out of a regulation location, it decreases at an early stage, and rotation by the inertia of a rotation output member is regulated by the regulation location, and is suspended calmly.

[0016] As a gestalt of operation, a rotation driving member can be constituted from body of revolution of the tail end of the epicyclic gear moderation device in which a motor output is slowed down, and a rotation output member can be formed in the shape of a shaft. Moreover, the holddown member of a lock device can be formed in the shape of a ring.

[0017] As a gestalt of operation, two or more sets of lock operation parts by the lock member and the lock operating member can be formed in the above-mentioned lock device.

[0018] moreover, the body of revolution (metal — it is — the shape of a roller —) which makes 1 set the pair which made said lock member correspond to normal rotation and an inversion from said rotation output member side cylindrical — being spherical — it can form and can form by the member equipped with the wedge inclined plane of the pair made to correspond to the normal rotation which said lock operating member is made to correspond to normal rotation and an inversion from said rotation output member side, and carries out the pressure welding of the above-mentioned body of revolution corresponding to a hand of cut to a holddown member by the wedge effectiveness, and an inversion.

[0019] Moreover, said lock member can be formed with the brake shoe which carries out the pressure welding of the holddown member, and it can form by the member equipped with the operating cam side which carries out pressure-welding actuation of the above-mentioned brake shoe for said lock operating member at a holddown member by the normal rotation or the inversion from said rotation output member side.

[0020] As a gestalt of operation, said regulation means is formed between the release member interlocked with a rotation driving member and a rotation output member, a regulation crevice is formed in a predetermined regulation location at the above-mentioned release member, from a this side and the rotation output member side which counters the above-mentioned

regulation crevice can be energized at the energization force, and location regulation can be carried out.

[0021] Moreover, said regulation means is formed between the tail end edge surface part of a rotation driving member, and a rotation output member, a regulation crevice is formed in the above-mentioned tail end edge surface part in a predetermined regulation location, from the this and rotation output member side which counters, the above-mentioned regulation crevice can be energized by the energization force, and location regulation can be carried out.

[0022] As a gestalt of operation, the location side corresponding to the edge within the play angle of said output driving mechanism, said lock member can set the regulation location of said regulation means to the location side corresponding to the location by which lock discharge was carried out, and can also set it as the midpoint within a play angle further.

[0023] Moreover, while forming with the snap arm which extended a means to give the energization force of said regulation means, from the peripheral face of a snap ring to the circumferencial direction, and set up the energization force, 2 sets of snap arms which carried out the extension direction of this snap arm in the opposite direction can be engaged and formed in one regulation crevice. According to this configuration, buffer actuation (snap action) corresponding to the normal rotation side of a regulation means and an inversion side can be made into the same conditions.

[0024] a location just before this lock member acts said lock member as a gestalt of operation — the elasticity by the side of lock discharge — it can support by the supporter material which permits a variation rate, and it can form so that elasticity may produce this supporter material with the ingredient by piano wire rods or synthetic resin, a metal plate, etc. According to this configuration, a supporter material side can also buffer the impact at the time of a lock operation.

[0025] As a gestalt of operation, a buffer member can be infixed in a fixed means to fix said holddown member of a lock device, and it can fix to it. According to this configuration, a fixed means side can also buffer the impact at the time of a lock operation.

[0026] Furthermore, the rotation output unit of this invention can be infixed in the output system of a power tool, and also it can be used for the equipment which needs a rotation output.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of the rotation output unit used for the power tool of a hand type.

[Drawing 2] The expanded sectional view of a rotation output unit.

[Drawing 3] The decomposition explanatory view which wrote together decomposition and the side face of each component of a rotation output unit.

[Drawing 4] The side elevation of the important section of a rotation output unit.

[Drawing 5] The side elevation showing connection on an output shaft and a carrier.

[Drawing 6] The decomposition sectional view of a torque limiter.

[Drawing 7] The side elevation showing other examples of a retaining ring.

[Drawing 8] The side elevation showing the example of further others of a retaining ring.

[Drawing 9] The expanded sectional view showing other examples of the regulation means of a rotation output unit (C-C' line view cross section of drawing 11).

[Drawing 10] The decomposition explanatory view of the regulation means in drawing 9.

[Drawing 11] The A-A' line view cross section of drawing 9.

[Drawing 12] The B-B' line view cross section of drawing 9.

[Drawing 13] The side face which shows other examples of the regulation means of a rotation output unit.

[Drawing 14] The explanatory view by the cross section and side face of a lock ring in drawing 13.

[Drawing 15] The side elevation showing other examples of a lock device.

[Drawing 16] The side elevation showing the operating state of drawing 15.

[Description of Notations]

- 10 — Rotation output unit
- 15 — Carrier
- 21 — Release ring
- 22 — Snap ring
- 23 — Retaining ring
- 24 — Wedge roller
- 25 — Lock ring
- 27 — Stop ring
- 28 — Output shaft
- 31 — Shaft form connection section
- 32 and 35 — hole — the type connection section
- 37a, 37b — Wedge inclined plane
- 39 — Inner skin
- 41 — Release projection
- 42a, 42b — Regulation crevice
- 43 — Regulation heights
- 44 — Snap arm
- 64 — Stop section
- 87 — Pin
- 88 — Buffer member
- 91 — Brake shoe
- 92 — Inverted cam
- 93a, 93b — Cam side

[Translation done.]